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ABSTRACT

Children are at greater risk than adults for lead poisoning because children absorb lead more readily than adults, and a small amount of lead in children's bodies can do a great deal of harm. Some of the causes and effects of childhood lead poisoning and suggests some lead poisoning prevention strategies that parent educators can share with parents are summarized in this document. How blood lead levels are measured is also explained, the occurrence of elevated blood lead levels among children, physical symptoms and effects, and broader social effects of the damage caused by lead poisoning is then examined. The digest then looks at ways parents can prevent lead poisoning, advising how to attend to specific lead risks in the home, at work, within children's diets and consumer products, and the medical establishment. Finally, the parents' role in the prevention of lead poisoning is highlighted, concluding the digest. (HTH)

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Helping Parents Prevent Lead Poisoning

Helen J. Binns and Omar Benton Ricks

Lead poisoning occurs when too much lead gets into the body. Children are at greater risk than adults because children absorb lead more readily than adults, and a small amount of lead in children's bodies can do a great deal of harm. Lead can cause irreversible damage to a child's developing brain (Agency for Toxic Substances and Disease Registry [ATSDR], 1995; Bellinger et al., 1992; Dietrich et al., 2001). The effects of lead poisoning on children can therefore have a significant, long-lasting impact on learning and behavior (Banks et al., 1997; Environmental Protection Agency [EPA], 1999; Satcher, 2000; Schwartz, 1994).

One measure of lead in the body is the *blood lead level* (BLL), measured in micrograms of lead per deciliter of blood (µg/dL). Nearly everyone has a measurable BLL. The Centers for Disease Control and Prevention (CDC) says that BLLs of 10 µg/dL or above are cause for concern (CDC, 2000a). However, even at BLLs below 10 µg/dL, lead can impair development (American Academy of Pediatrics [AAP], 1998; Banks et al., 1997; Bellinger et al., 1992; Landrigan, 2000; Lanphear et al., 2000; Schwartz, 1994). This Digest summarizes some causes and effects of childhood lead poisoning and suggests some lead poisoning prevention strategies that parenting educators can share with parents.

What Is Known about Childhood Lead Poisoning?

Occurrence in Children. The prohibition of many lead products in the United States—especially leaded gasoline, residential lead paint, and lead solder in canned foods—has drastically reduced the average BLL of U.S. children since 1978 (CDC, 2000a). However, the CDC estimates that 890,000 children under 6 years of age may still have unsafe BLLs (CDC, n.d.). Moreover, urban and rural areas with older homes have high rates of lead poisoning (CDC, 2000a; Norman et al., 1994). A recent national survey of homes in which young children live estimated that lead hazards existed in 94% of the homes built before 1940 and in 87% built from 1940 to 1959 (Housing and Urban Development [HUD], 2001). The risk for elevated BLLs is disproportionately high in low-income and minority communities, even after home age is taken into account (CDC, 2000b).

Symptoms and Effects for Individuals. Lead poisoning may not affect all children in the same ways. Most children with elevated BLLs lack any physical symptoms. The few who do show symptoms may have very subtle, common symptoms such as headaches, stomachaches, sleeping problems, and irritability (ATSDR, 1995; Banks et al., 1997). The longer-term effects of lead poisoning can include lowered IQ, reading and math disability, short-term memory loss, hearing problems, hyperactivity, and a host of other cognitive and behavioral problems (Lanphear et al., 2000; Schwartz, 1994). Available evidence suggests that the effects of lead poisoning on cognitive development and behavior are long term and irreversible (Burns et al., 1999; Dietrich et al., 2001; Rogan et al., 2001). If left untreated, high BLLs can cause slowed growth; damage to the kidney, brain, and nerves; and, in extreme cases, death (CDC, n.d.; EPA, 1999). Children under 2 years of age are at the highest risk for lead poisoning, since they tend to put non-food items in their mouths. In addition, lead exposure at this age can be particularly harmful to children's cognitive and behavioral development (Bellinger et al., 1992; Dietrich et al., 2001).

Broader Social Effects. Many controlled observation studies relate higher BLLs to lower IQ scores, even at BLLs below the CDC level of concern (Banks et al., 1997; Lanphear et al., 2000; Lewendon et al., 2001; Schwartz, 1994). The impact on IQ may be small for an individual child, but the effects on the population as a whole may be much broader: an estimated two- to fourfold increase in the number of children categorized as "mentally retarded" and a similar reduction in the number of children categorized as "gifted" (Banks et al., 1997). Low-level lead poisoning may therefore increase special education costs, in addition to medical costs (Banks et al., 1997; Satcher, 2000). Moreover, numerous studies have demonstrated that children with lead poisoning are more likely to have long-term behavioral problems, including a higher likelihood of delinquent behavior (Banks et al., 1997; Dietrich et al., 2001; Lewendon et al., 2001).

How Can Parents Prevent Lead Poisoning?

Parenting educators can stress how important it is for parents to be aware of the risk factors for lead poisoning and to minimize their child's exposure *before* poisoning occurs.

Risks at Home. Most exposure to lead occurs at home. Older homes often have leaded interior or exterior paint. Dust from the deterioration of this paint can create a lead hazard. The most common sites of risk in the home are at windows, porches, or entryway areas. Parents can be advised to keep these areas clean and prevent children from playing in these areas unless the risk of exposure is low. Renovations that disturb leaded paint can release dust in a home and should not be attempted without expert advice and training. Soil around older homes may be contaminated with lead from paint residue, and soil along busy streets may have leaded gasoline residue. At-risk children may also live in areas with industries nearby such as lead smelters or battery recycling plants that have emitted lead dust into the air and soil (ATSDR, 1995).

Parents can be advised to check for peeling or chipping paint in their home, clean those areas with soap and water, and make arrangements for safe, professional repair. Local public health agencies can sometimes help. Parents who are concerned that their home may pose a risk can have certified lead inspectors or risk assessors check the amount of lead residue in paint and dust throughout their home and in their soil. These individuals may be able to tell parents if the lead in their home presents a risk, offer suggestions about the least intrusive ways to remove any risks, and recommend certified lead abatement specialists, if necessary (CDC, n.d.; EPA, 1999; see also http://www.leadlisting.org to locate abatement professionals).

Lead found in water tends to occur in much lower concentrations than lead in paint or soil, and it therefore presents much lower risk. The major source of lead in water is the solder found in pipes in older homes. Before using water for cooking or drinking, parents are advised to: (1) run tap water for 15 to 30 seconds if it has not been used for a few hours; and (2) use cold water, which leaches lead more slowly than warm or hot water (EPA, 1999).

Risks from Work. Parents with jobs that involve contact with lead—such as law enforcement, plumbing, automobile repair, construction, and mining—risk bringing lead dust home on their clothes and passing it on to their families. These parents can be advised to change clothes before coming home, keep work clothes separate from house clothes, and wash them separately (ATSDR, 1995; EPA, 1999; Occupational Safety and Health Administration [OSHA], 2000).

Healthy Habits. Children with iron deficiency or with low daily calcium intake absorb lead more readily, so parents will want to make sure that their child's diet contains sufficient—although not excessive—amounts of these nutrients (ATSDR, 1995; AAP, 1998; EPA, 1999). Parents cannot prevent their children from putting things in their mouths, but parents can prevent them from reaching potentially dangerous items and teach them to wash their hands before eating. These measures are parts of the solution, but they are insufficient to prevent lead poisoning if the environmental risk is still present.

Certain leaded products imported from countries that have not banned the use of lead are available in the United States—including foods, dyes, cosmetics, and folk medicines (CDC, 1998; Lynch et al., 2000). It is difficult for federal and state regulatory authorities to prevent the importing of all unsafe products. It is important for parents to know the contents of products their families use and to avoid using products they suspect are not approved by the Food and Drug Administration (http://www.fda.gov).

Medical Checkups. Elevated BLLs often go undetected until they get very high. Only 19% of children ages 1–5 who were on Medicaid received BLL tests in 1998, even though children on Medicaid accounted for a large majority of the instances of elevated BLLs among U.S. children (CDC, 2000b). Parents of children at risk for lead exposure can be advised to have their children routinely screened for rising BLLs—young children should be screened several times before the age of 3—at least at ages 12 months and 24 months (EPA, 1999; AAP, 1998).

Conclusion

The prevention of lead poisoning is the focus of many national, state, and local agencies and organizations; parents also play a major role. Helping parents get informed is an important first step. There are many sources of high-quality parent-friendly resources; the local public health agency, the National Lead Information Center at 1-800-424-LEAD, and the Alliance to End Childhood Lead Poisoning Web site at http://www.aeclp.org are just a few.

For More Information

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